power mate

PMC

POWER/MATE CORP. SEL

SERVICE MANUAL
for
REGULATED POWER SUPPLY

BPA-40F

CONTENTS

1.0 SPECIFICATIONS
2.0 OPERATING INSTRUCTIONS
3.0 PRINCIPLE OF OPERATIONS
4.0 MAINTENANCE
5.0 SERVICE
6.0 PARTS ORDERING
7.0 PERFORMANCE CHECK
8.0 ELECTRICAL PARTS LIST
9.0 SCHEMATIC DIAGRAM
10.0 CONNECTION DIAGRAMS

POWER/MATE CORP. 514 S. River Street Hackensack, New Jersey 07601

SEL

BPA SERIES

INPUT:	105-125 VAC or 190-226 VAC or 210-250 VAC, 47-63 Hz operation, internally selected, For 50 Hz operation, derate current rating by 10%.
OUTPUT VOLTAGE:	See respective charts
OUTPUT VOLTAGE RANGE:	Set by continuously variable coarse and fine DC output adjustment potentiometers.
VOLTAGE REGULATION:	Line - 0.01% + 1 mV for total line variations specified above. Load - 0.01% + 1 mV for load variations form 0 to full load.
RIPPLE:	Less than 500 microvolts RMS.
REMOTE PROGRAMMING:	RESISTANCE: 350 ohms per volt for 6 volt models, 200 ohms per volt for all other models. VOLTAGE: volt per volt (voltage source must be capable of sinking 10 mA).
OUTPUT CURRENT:	See respective charts.
CURRENT REGULATION:	(Automatic crossover)
METERS:	Standard voltage current monitoring rated accurate to 2% of full scale value.
POLARITY:	The output may be "floated" up to 300V peak. Either polarity may be grounded to the chassis.
REMOTE OR LOCAL SENSING:	Provisions are included to permit remote sensing of the output voltage directly at the load for improved overall regulation on all models. Units may also be connected for local sensing, if desired.
OVERSHOOT:	No voltage overshoot on turn-on/off or failure.
TRANSFORMERS:	Meets MIL-T-27 specifications.
AMBIENT OPERATING TEMPERATURE:	Continuous duty from-20°C to + 71°C.
STORAGE TEMPERATURE:	55°C to + 85°C
TEMPERATURE COEFFICIENT:	Better than 0.01% + 100 microvolts per °C .

OVERLOAD PROTECTION:	Load and power supply protection is accomplished by an adjustable electronic current limiting circuit controlled from a front panel potentiometer.
QUALITY CONTROL:	In accordance with MIL-1-45208.
VOLTAGE ADJUSTMENT:	Concentric coarse and fine control.
CURRENT ADJUSTMENT:	Single vernier driven control on all models.

2.0 OPERATING INSTRUCTIONS

2.1 GENERAL

All Power/Mate power supplies are carefully inspected and tested to insure conformance to our published specifications as stated in the catalog. However, to insure satisfactory performance and long life, it is important to operate and maintain the power supply properly in accordance with these instructions.

2.2 POWER SUPPLY MOUNTING

All Power/Mate supplies are designed for convention cooling. However, it is important not to impede the air flow across and through the power supply case. Heat is the primary cause of failure in any piece of electronic equipment. Impeding the flow of convection air through your power supply may result in a shortening of the long-life designed into by Power/Mate.

Conversely, forced air, from a small fan, through the heat generating components of the power supply, can overcome any impediment of the natural convention air flow. If there is any doubt as to the amount of convection air flow through your Power/Mate power supply, the use of a small fan to insure a satisfactory air flow is recommended.

When chassis mounting any Power/Mate power supply using the bottom mounting holes, make sure that the ventilation holes in the power supply chassis are not covered by the mounting chassis. The mounting chassis should have cut-outs approximating the ventillating holes in the power supply. This permits the normal air convection throught the power supply.

An alternative method to permit proper air convection current is to provide a 1/2 inch space (minimum) between the power supply and the mounting chassis.

2.3 OUTPUT VOLTAGE ADJUSTMENTS

The output of most Power/Mate power supplies can be adjusted simply by monitoring the output voltage on a meter placed across the output terminals or by means of the front panel meter (where applicable.) Power/Mate

power supplies that have a large output voltage adjustment range have both coarse and fine voltage controls to more accurately set the output voltage.

2.3.1 UNI SERIES POWER SUPPLY OUTPUT ADJUSTMENT

All UNI Series (universal series) power supplies as shipped from the factory are set for a nominal 5 volts output. These power supplies may be set for any output from zero to 30 volts by the following procedure:

1. Remove the cover on case size A,B, and BB. Remove the rear panel on case size C through H.

2. Select the proper tap for the desired output voltage range. The voltage range for each tap is indicated on the transformer.

3. Set coarse and fine voltage controls (accessible from terminal block side of power supply) to nominal center position.

4. Make sure + (pos.) terminal and + sense terminal are connected together. Similarly, make sure - (neg.) terminal and - sense term are connected together.

5. Connect 115 volt to AC input terminals.

6. Connect an accurate meter to DC output terminals of power supply.

7. Adjust the coarse voltage control to the desired output voltage.

8. Turn off the AC, replace the cover or rear panel. The fine voltage control may be used to more accurately adjust the output voltage to the precise desired value.

*** CAUTION ***

THE POWER SUPPLY MAY BE DAMAGED IF THE COARSE CONTROL IS SET TO OPERATE THE POWER SUPPLY OUTSIDE OF THE VOLTAGE RANGE LIMITS NOTED ON THE TRANSFORMER TAP RANGE SETTING INSIDE OF THE POWER SUPPLY.

2.4 LOCAL - REMOTE LOAD SENSING

This power supply may have a local-remote load voltage sensing feature. This can be determined from the specifications for this power listed in Section 1.0 of this instruction manual, and is available on power supplies with + sense terminals marked on the terminal block. Power supplies shipped from the factory are normally connected for local sensing. Connections for remote or local load sensing is shown in Fig. 1.

2.5 LOAD CONNECTIONS

To keep lead voltage drop to a minimum, the largest practical wire size should be used. The following table shows how much drop to expect for a given size wire if the power supply is located 5 feet (10 feet of wire) from the load. For proper power supply operation with remote sensing, the voltage drop in each load lead should not exceed 0.75 volts.

WIRE SIZE	DC DROP IN MILLIVOLTS PER AMPERE
22	155
20	100
18	65
16	40
14	25
12	15
10	10

2.6 OUTPUT CURRENT ADJUSTMENTS

On power supplies with an output current limit control, this may be adjusted as follows:

Connect an ammeter across the output terminals of the power supply. Use an ammeter with a range greater than the desired current limit setting. Remove all other loads from the power supply. Apply AC to the input of the power supply and adjust the current limit control to the desired current as indicated on the ammeter. This adjustment limits the output current from the power supply under all load conditions.

*** CAUTION ***

Make sure that this current setting is within the ratings of the power supply otherwise overheating and possible damage may occur to your power supply. Make certain that the power supply output voltage is set to the normal output voltage under normal or open circuit load conditions, before adjusting the current setting. Make sure the current setting is set beyond the "knee" of the current setting, otherwise the voltage regulation of the power supply may be affected.

On power supplies with front panel meters, it is only necessary to short circuit the output of the power supply. The current adjust may be set to the desired current limit as indicated on the front panel meter.

2.7 OVERVOLTAGE ADJUSTMENT

Many Power/Mate power supplies have overvoltage protection built-in to the power supply. This unit is also available as a separate unit.

The adjustment and checking of the overvoltage feature can be accomplished as follows:

Set the overvoltage adjustment to the highest voltage setting. Set the power supply output voltage to the desired overvoltage set point and monitor the output on a voltmeter. Typically, the overvoltage set point is at least 15% plus one volt above the normal output voltage of the power supply. This prevents spurious triggering of the OVP from external transients. Turn the overvoltage control slowly until the output of the power supply drops from the set point to approximately 0.6 volts. Turn off power for 15 seconds and readjust power supply voltage controls to normal setting. Re-apply power and readjust output voltage to normal output voltage.

In the event that the power supply cannot be adjusted to the desired overvoltage set point, an externally adjustable power supply connected across the output terminals of the power supply may be used.

Under certain conditions, the AC input current can become large when the overvoltage protector operates. It is recommended the following fuse rating be used in the AC input lead to the power supply.

$$\text{Input fuse rating, Slo-blo type} = \frac{\text{Output voltage x output current x 4}}{\text{Nominal line voltage}}$$

3.0 PRINCIPLES OF OPERATION - SERIES REGULATED POWER SUPPLIES

A series regulated power supply consists basically of, 1. An unregulated power supply. 2. A controlled resistive series element which acts to "regulate" or control the output voltage fluctuations resulting from load or input line changes. 3. A closed loop control system that senses the changes in the output of the power supply and acts on the series resistive element to maintain the output voltage constant.

The control of the output voltage is achieved controlling the voltage drop across the series element which results in some level of power dissipation in the series element. Thus the output power of the regulated power supply is equal to the power generated at the output of the unregulated power supply less the power absorbed by the series regulator.

The amount of power dissipated in the series element is determined in part by the load current through the series resistive element. At no-load, the amount dissipated in the series pass element will be very low. The power dissipation also is determined by the voltage drop required across the series element. to maintain the specified regulation of the power supply. This voltage drop is the sum of all the internal losses in the supply, plus 1) the contribution of line voltage variations, 2) the peak - to-peak ripple that gets past the first or "input" filter, 3) a margin for remote error sensing, 4) the minimum voltage needed for full conduction, and 5) a safety factor. The sum of all these factors will usually be much less than the total voltage; i.e., seldom more than 25%.

The series pass elements used to dissipate the power is one or more power transistors in parallel. These are mounted on a suitable heat sink which is designed to take the heat absorbed by the series pass transistor and dissipate it into the air by means of convection cooling.

The simplest constant voltage regulator consists of a reference, a D.C. voltage amplifier, a D.C. current amplifier and a feedback system. There are two types of

these circuits in common usage. The first is shown in Figure 1., where a zener is shown as a reference and RFB is a variable potentiometer.

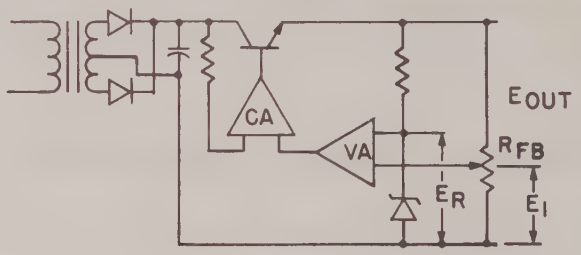


FIGURE 1

VA is a voltage amplifier and CA is a current amplifier. Obviously, if the output current requirements are low enough, CA is not needed. EI and ER are maintained equal by the voltage and current gains of the respective amplifiers and the system resembles a "self balancing Wheatstone bridge.

The other type of constant voltage regulator circuit is called the " floating " regulator. It is shown in Figure 2. It, too, consists of a reference, and two amplifiers. This time the reference is taken from another winding on the transformer. To keep line voltage variations from producing unwanted variations in the reference, we show a preregulator for the reference which consists of other zeners or constant current generators or both, depending on the accuracy or attenuation required.

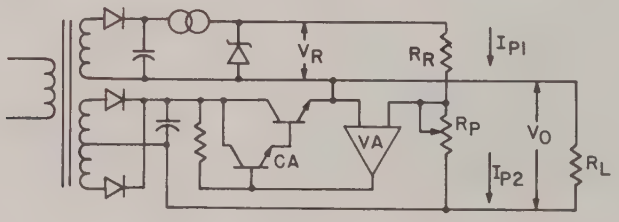


FIGURE 2

Notice that although one side of the zener is still attached to the output, there is a different arrangement of the feedback resistors. This is explained as follows:

Due to the fact that with the very high voltage gain of VA there is virtually no difference between the - of the zener and the intersection of resistors R_R & R_p, the voltage across R_R equals the zener voltage V_R. Further, that with suffiviently high current gain CA and additional power gain of VA, virtually no input current is drawn through R_R, then $I_{p2} = I_{p1}$ and $VR = I_{p1} R_R$ and $VO = I_{p2} R_p = I_{p1} R_p$. The power supply can now easily be adjusted to zero and the voltage is truly proportional to R_p since V_R and R_R remain constant. Figure 1 can be redrawn as an operational amplifier (which has both voltage & current gain) as in Figure 3 and EV_R is the unregulated B+ and R_p acts as the feed-back resistor.

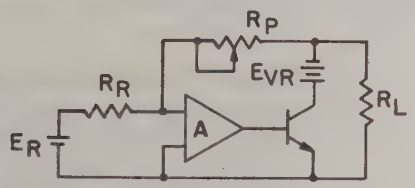


FIGURE 3

In effect the constant voltage regulated D.C. power supply is a very high gain closed loop negative feedback operational amplifier which acts to keep the output exactly equal to a highly regulated reference element.

4.0 MAINTENANCE

4.1 GENERAL

This section describes trouble analysis routine and test procedures that are useful for servicing the power supply. A trouble chart is provided as an aid for the troubleshooter. Refer to the section on specifications and features for the minimum performance standards.

4.2 TROUBLE ANALYSIS

Whenever trouble occurs, systematically check all fuses, primary power lines, external circuit elements, and external wiring for malfunction before trouble shooting the equip-

ment. Failures and malfunctions often can be traced to simple causes such as improper jumpers and supply-load connections or fuse failure due to metal fatigue.

Use the electrical schematic diagram as an aid to locating trouble causes. Use measuring probes carefully to avoid causing short circuits and damaging circuit components.

4.3 CHECKING TRANSISTORS AND CAPACITORS

Check transistors with an in-circuit transistor checker. If no checker is available, transistors can be checked with an ohmeter that has a highly limited current capability. Observe proper polarity for PNP or NPN to avoid error in measurement. The forward transistor resistance is low, but never ZERO; backward resistance is always higher than the forward resistance.

Do not assume trouble is eliminated when only one part is replaced. This is especially true when one transistor fails, causing other transistors to fail. Replacing only one transistor and turning power on, before checking for additional faulty components could damage the replaced component.

When soldering semi-conductor devices, hold the lead being soldered with a pair of pliers or a commercial heat sink device placed between the component and the solder joint.

NOTE: The leakage resistance obtained from a simple resistance check of a capacitor is not always an indication of a faulty capacitor. In all cases, the capacitors are shunted with resistances, some of which have low values. Only a dead short is a true indication of a shorted capacitor.

4.4 PRINTED CIRCUIT BOARD MAINTENANCE TECHNIQUES

1. If foil is intact but not covered with solder, it is a good conductor, Do not attempt to cover with solder.

2. Voltage measurements can be made from either side of the board. Use a needle point probe to penetrate to the wiring whenever a protective coating is used on the wiring. A brass probe can be soldered to an alligator clip adapted to measuring instrument.

3. Broken or damaged printed wiring is uaually the result of an imperfection or strain. To repair small breaks, tie a short piece of hook-up wire to bridge the break, and holding the wire in place, flow solder along the length of the wire so that it becomes part of the circuitry.

4. When unsoldering components from the board, never pry or force loose the part; unsolder the component by using the wicking process described below:

   (a) Select a 3/16 inch tinned copper braid for use as a wick; if the braid is not available, select AWG No. 14 or No. 16 stranded wire with 1/2 inch insulation removed.

   (b) Dip the wick in liquid rosin flux.

   (c) Place the wick onto the soldered connection and apply soldering onto the wick.

   (d) When sufficient amount of solder flows onto the wick, freeing the component simultaneously remove iron and wick.

4.5 TROUBLE CHART

The trouble chart is intended as a guide for locating trouble causes, and is used along with the schematic diagram.

The operating conditions assumed for the trouble chart are as follows:

(a) AC power of proper voltage and frequency is present at input terminals.

(b) Either positive or negative terminal is connected to chassis ground.

(c) The power supply is connected for constant voltage with local sensing.

TROUBLE CHART

SYMPTOM	PROBABLE CAUSE	POSSIBLE REMEDY
1. No Output	No input power	Replace and recheck
	Blown input fuse	Replace and recheck
	Blown output fuse	Reset by cooling or shuting with clip leads.
	Thermostat open	
	Open wiring on transformer	Replace power transformer.
	Faulty reference Zener	Replace Zener diode
	Faulty integrated circuit	Replace integrated circuit with good.
	Open driver transistor	Check with ohmmeter, replace if defective.
	Internal short across output	Check with ohmmeter Check SCR for shorted anode to cathode.
2. Output .5 - 1.0 Volt	Overvoltage Protector Operating	Turn AC input off and then on, to reset SCR. Check SCR replace if defective Readjust OVP control.
3. Output voltage high-unregulated high 120 Hz ripple no adjustment	Open voltage adjust control or sense leads	Check sense jumpers
	Shorted driver transistor	Check Driver Transistor and replace if necessary.
	Shorted darlington or power transistor	Check for shorts possibly may be PC Board short. Check lands.
4. Output voltage too low- high ripple no adjustment	Supply in current	Remove and reduce load.
	Current limit pot defective	Check or readjust current limit pot.

		Emitter resistor on pass transistor intregrated circuit defective	Check with ohmmeter. Should be less than .2 ohms. Replace intregrated circuit.
5.	Either output cannot be grounded to chassis	Hi pot failure	Check wiring for melted or pinched insulation due to overheating or mechanical failure.

5.0 SERVICE

When additional instructions are required or repair service is desired, contact the Power/Mate Corp. where trained personnel and complete facilities are ready to assit you.

Please include the power supply model and serial number together with complete details of the problem. On receipt of this information, Power/Mate will supply service data or advise shipping for factory repair service.

All repairs not covered by the warrenty will be billed at cost and an estimate forwarded for approval before work is started.

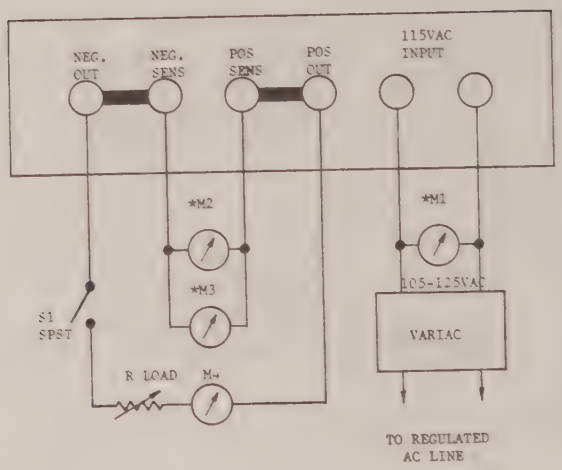
6.0 PARTS ORDERING

Standard components and special components used in any Power/Mate power supply can be obtained from the factory.

The following information must be included when ordering parts:

1. Model number and serial number of power supply and purchase date.
2. Power/Mate part number.
3. Description of part together with reference designation.
4. If part is not an electronic part, or is not listed, provide a description, function, and location of the part.

7.0 PERFORMANCE CHECK



See connection diagram for model under test.

*M2 - Differential D.C. Voltmeter
John Fluke - Model 825A or equal.

*M3 - True RMS Voltmeter Ballantine
Model 320A or equal.

1. Connect power supply - according to enclosed connection diagram for model under test.
2. Apply input power.
3. Adjust output voltage to desired level.
4. Adjust load current for rated full load current.

NOTE: ALLOW 1/2 HR. WARM-UP PRIOR TO PERFORMING ANY TEST!

LOAD REGULATION

a) Adjust input voltage for 115 VAC
b) Record output voltage (M2)
c) Open switch S1 - Record output voltage (M2) Difference between reading obtained in "b" & "c" is load regulation.

LINE REGULATION

a) Close switch S1
b) Adjust load current to full load rating of unit
c) Adjust input voltage to 105 VAC. Record output voltage (M2)
d) Adjust input voltage to 125 VAC. Record output voltage (M2) Difference between readings obtained in "b" & "c" above is " Line Regulation "

RIPPLE

a) Close switch S1
b) Adjust input voltage to 105 VAC
c) Record ripple as indicated by meter M3

ISSUE A

DATE & APP'VAL

Electrical Parts List For

DESCRIPTION: BPA-F

ITEM NO.	PART NUMBER P.M.C. PART NO.	REV	VENDOR	PMC DWG NO. OR VENDOR PART NO.	SIZE	DESCRIPTION	SCHEMATIC REFERENCE
1	FA 943402	H				FINAL ASSY	
2	TE 153903	M				TERMINAL BLOCK, 3 POS	TB2
3	TE 109805	A				TERMINAL BLOCK, 5 POS	TB1
4	MI 220513	A	BUSS	MDA		FUSE 20A 250V S.B.	F1
5	TA 947303	C				TRANSFORMER ASSY	T1
6	CE 924304	D	MI			CAPACITOR 24000 MFD/40V	C21, C22
7	MI 348500	A	348500			MOTOR	B1
8	DR 020000	A				DIODE	CR15, CR16, CR17-CR18
9	CP 410400	B				CAPACITOR 0.1 MFD/200V	C16
10	DS 051000	A				SCR 40A 50V	CR53 (OV OPTION)
11	DR 017000	A	IRC	IN 1185		DIODE	CR52 (OV OPTION)
12	R2 401200	A				SHUNT RESISTOR	R36
13	CE 920204	E				CAPACITOR 2000 MFD/40V	C15
14	GM 902600		HOYT	2025		METER 2½"	M1, M2
15	GM 902610	A		GM 9026XX		SCALE 0-12 AMPS	M1
16	GM 902636	A		GM 9026XX		SCALE 0-20 VOLTS	M2
17	PF 041200	A	CLARO	D45-4		POTENTIOMETER 4000/100	R25/26
18	PF 710100	A	CTS	VA-AW		POTENTIOMETER 100~ 10%	R13
19	SW 504300	A				SWITCH ON/OFF, SPST	SW1
20	MI 204900	A				LAMP ASSY	DS1
21	QP 001000	A	RCA	2N3055		TRANSISTOR TO 3	Q62, Q71, Q72

POWER/MATE CORP.
HACKENSACK, N.J.

PREPARED BY DATE

CHECKED BY DATE

SIZE A | CODE IDENT. NO. 23934 | LM

ASSEMBLY SHEET SIZE

SHEET 1 OF 4

ISSUE A

DATE & APP'VAL

ELECTRICAL PARTS LIST FOR

DESCRIPTION: BPA-F

ITEM NO.	PART NUMBER: P.M.C. PART NO.	REV	VENDOR	PMC DWG NO. OR VENDOR PART NO.	SIZE	DESCRIPTION	SCHEMATIC REFERENCE
22	QP 001000	A	RCA	2N3055		TRANSISTOR TO3	Q76, Q77, Q78
23	SW 506200	A				THERMOSTAT 145°C	SW2
24	RC 212100	A				RESISTOR 120 10% ½W	R62
25	RC 247000	A				RESISTOR 47 10% ½W	R63
26	WI 150000	A				WIRE CUPRON #24	R71, R72
27	RC 247000	A				RESISTOR 47~ 10% ½W	R64
28	WI 150000	A				WIRE CUPRON #24	R76, R77, R78
29	RF 220100	A				RESISTOR 200~ 3% 3W	R1
30	RC 210300	A				RESISTOR 10K 10% ½W	R2
31	RC 222200	A				RESISTOR 2.2K 10% ½W	R3, R16
32	RC 212200	A				RESISTOR 1.2K 10% ½W	R4, R30
33	RC 233200	A				RESISTOR 3.3K 10% ½W	R5
34	RC 352300	A				RESISTOR 5.23K 1% ½W	R6, R18
35	RC 321500	A				RESISTOR 2.15K 1% ½W	R7, R19
36	PF 702030	A	MEPCO	ET 34P203		POTENTIOMETER 20K	R8
37	RC 356201	A				RESISTOR 5.62K 1% ½W	R9
38	PF 810100	A	CTS	TYPE 360		POTENTIOMETER 100 20% ½W	R10
40	RC 386601	A				RESISTOR 8.66K 1% ½W	R11
41	RC 334800	A				RESISTOR 3.48K 1% ½W	R12, R21
42	RE 227100	B				RESISTOR 270~ 5% 2W	R14, R15
43	RC 215100	A				RESISTOR 150~ 10% ½W	R17

POWER/MATE CORP.
HACKENSACK, N.J.

PREPARED BY DATE

CHECKED BY DATE

SIZE A | CODE IDENT. NO. 23934 | LM

ASSEMBLY SHEET SIZE

ISSUE A

DATE & APP'VAL

ELECTRICAL PARTS LIST FOR

DESCRIPTION: BPA-F

ITEM NO.	PART NUMBER P.M.C. PART NO.	REV	VENDOR	PMC DWG NO. OR VENDOR PART NO.	SIZE	DESCRIPTION	SCHEMATIC REFERENCE
45	PF 705020	A	MEPCO	ET 34P502		POTENTIOMETER 5K	R20
46	RF 210000	A				RESISTOR 10~ 3% 3W	R24
47	RC 139200	A				RESISTOR 392~ 1% ½W	R31
48	PF 850100	A	CTS	TYPE 360		POTENTIOMETER 500~	R32
49	CP 410400	B				CAPACITOR 0.1 MFD 200V	C1
50	CE 247700	A				CAPACITOR 470 MFD 40V	C2
51	CD 147100	F				CAPACITOR 470 PFD 1KV	C3
52	CT 247500	A				CAPACITOR 4.7 MFD 35V	C4, C7
53	CP 410400	B				CAPACITOR 0.1 MFD 250V	C5
54	CD 210300	F				CAPACITOR 0.01 MFD 100V	C6
55	CE 147600	B				CAPACITOR 47 MFD 63V	C8
56	CD 320200	B				CAPACITOR 0.002 MFD 100V	C9
57	DR 003000	A		S12		DIODE 1A 200V	CR1, 2, 4, 5, 8, 9
58	DZ 213000	A		IN754A		DIODE ZENER 6.8V 400MW	CR3
59	DZ 208000	B		IN4743		DIODE ZENER 13V 1W	CR6, CR7
60	QS 028000	A		2N4037		TRANSISTOR TO 5 PNP	Q1
61	QS 044000	A		2N2219A		TRANSISTOR TO 5 NPN	Q2
62	QI 001500	D		723C		REGULATOR	IC1, IC2
63	RC 329400	A				RESISTOR 2.94K 1% ½W	R22
64	RC 311500	A				RESISTOR 1.15K 1% ½W	R23
65	RC 326700	A				RESISTOR 2.67K 1% ½W	R28

POWER/MATE CORP.
HACKENSACK, N.J.

PREPARED BY DATE

CHECKED BY DATE

SIZE A | CODE IDENT. NO. 23934 | LM

ASSEMBLY SHEET SIZE

ISSUE A

DATE & APP'VAL

ELECTRICAL PARTS LIST FOR

DESCRIPTION: BPA-F

ITEM NO.	PART NUMBER P.M.C. PART NO.	REV	VENDOR	PMC DWG NO. OR VENDOR PART NO.	SIZE	DESCRIPTION	SCHEMATIC REFERENCE
66	RC 310500	A				RESISTOR 1.05K 1% ½W	R29
67	RC 320002	A				RESISTOR 20K 1% ½W	R27
						OVP OPTION	
68	RC 210300	A				RESISTOR 10K 10% ½W	R57
69	RC 211000	A				RESISTOR 10~ 10% ½W	R52
70	RC 212200	A				RESISTOR 1.2K 10% ½W	R53
71	RC 239000	A				RESISTOR 39~ 10% ½W	R54
72	RC 327400	A				RESISTOR 274~ 1% ½W	R55
73	PF 705020	A	MEPCO	ET 34P502		POTENTIOMETER 5K	R56
74	RC 239200	A				RESISTOR 3.9K 10% ½W	R57
75	RC 227000	A				RESISTOR 27~ 10% ½W	R58
76	MI 204800	E				THERMISTOR 25~5%	RT51
77	CT 268400	A				CAPACITOR 0.68 MFD 35V	C51
78	QS 037000			2N4036		TRANSISTOR TO5 PNP	Q51
79	QS 040000	A		2N2102		TRANSISTOR TO5 NPN	Q52
80	DR 003000	A		S12		DIODE 1A 200V	CR51

POWER/MATE CORP.
HACKENSACK, N.J.

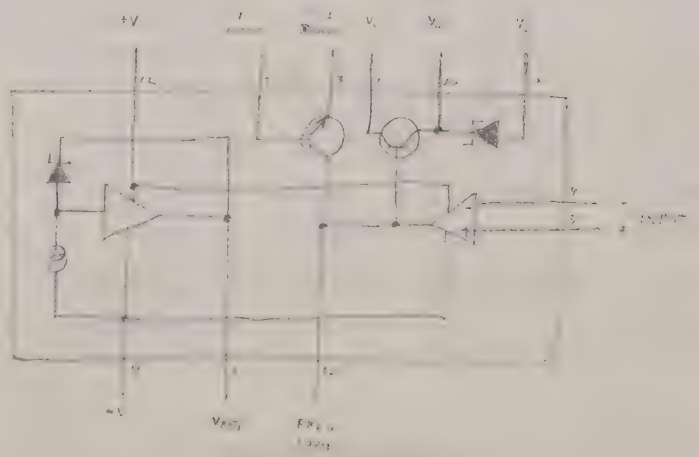
PREPARED BY DATE

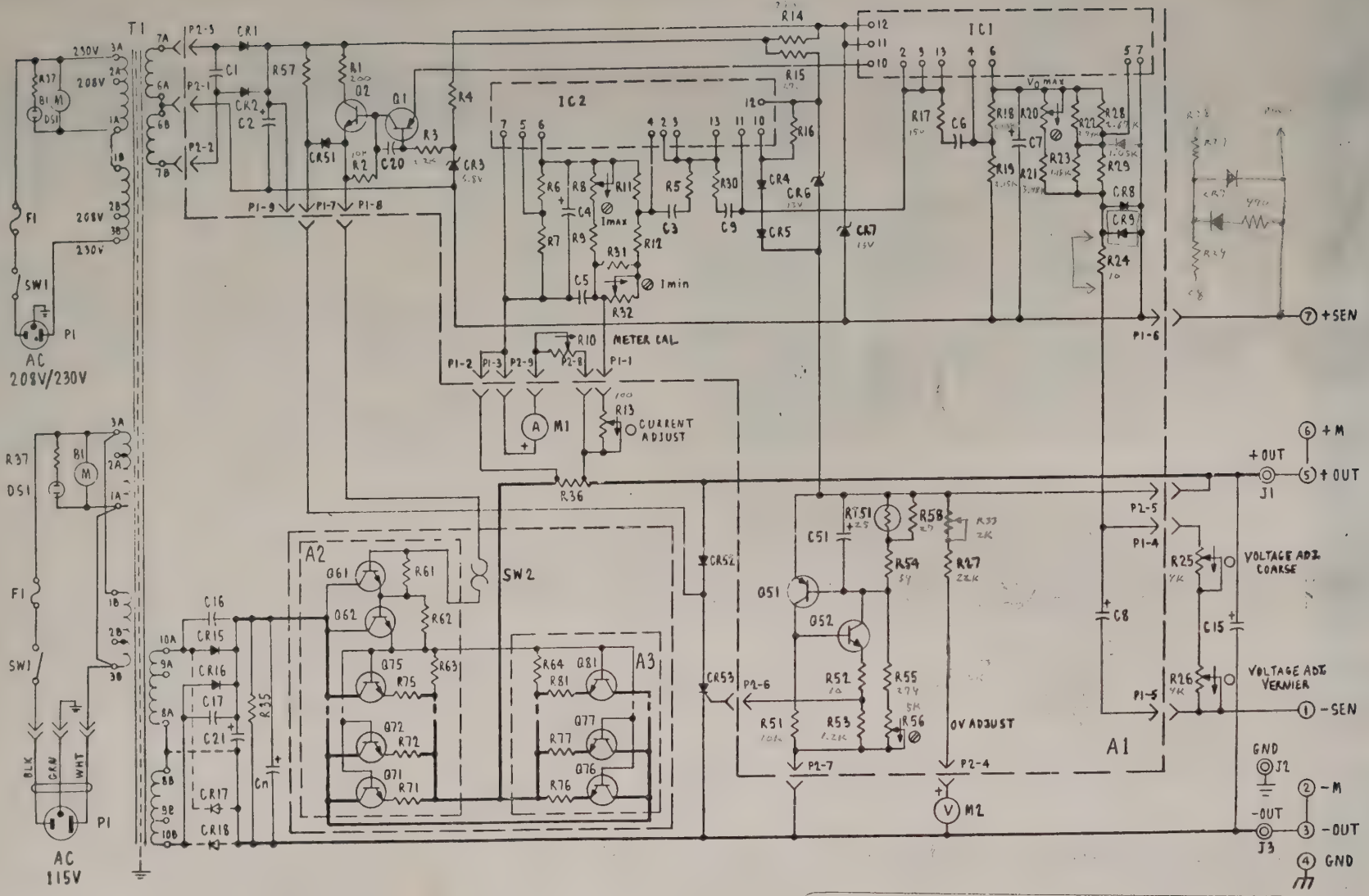
CHECKED BY DATE

SIZE A | CODE IDENT. NO. 23934 | LM

ASSEMBLY SHEET SIZE

I_C 192 723 VOLTAGE REGULATORS





SHAS UNLESS OTHERWISE SPECIFIED

COMPONENTS NOT USED

C10 - C14, C18, C19, Cn - C50
CR10 - CR14
R33, R34, R37 - R50, R59, R60, R65 - R70
Q3 - Q50, Q53 - Q60, Q63 - Q70

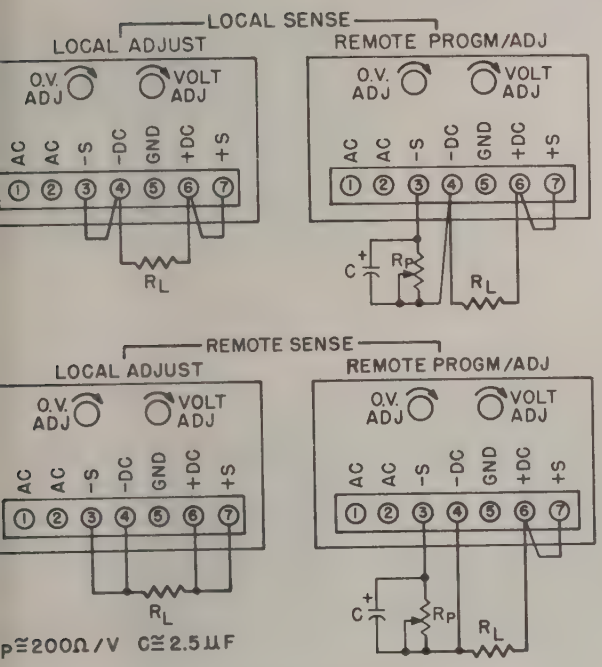
SCHEMATIC

BPA-N F

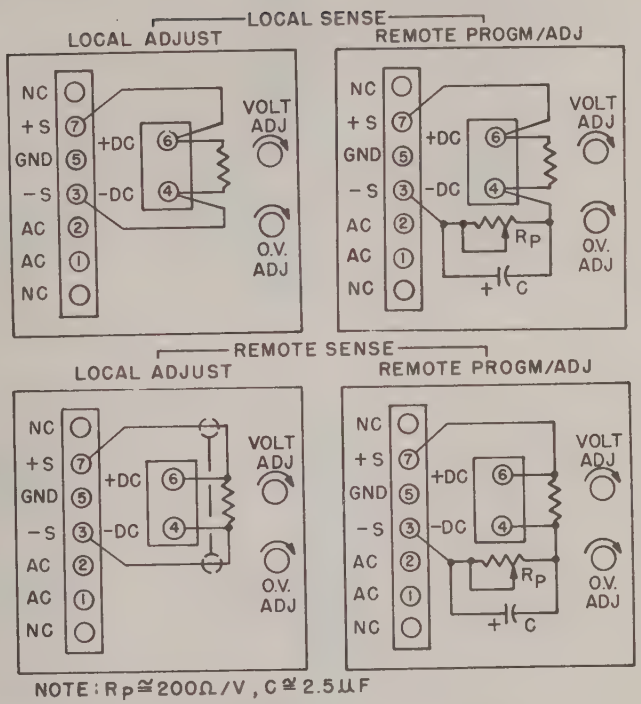
POWER/MATE CORP.
514 S. RIVER STREET
HACKENSACK, N. J. 07601

POWER SUPPLY CONNECTION DIAGRAMS

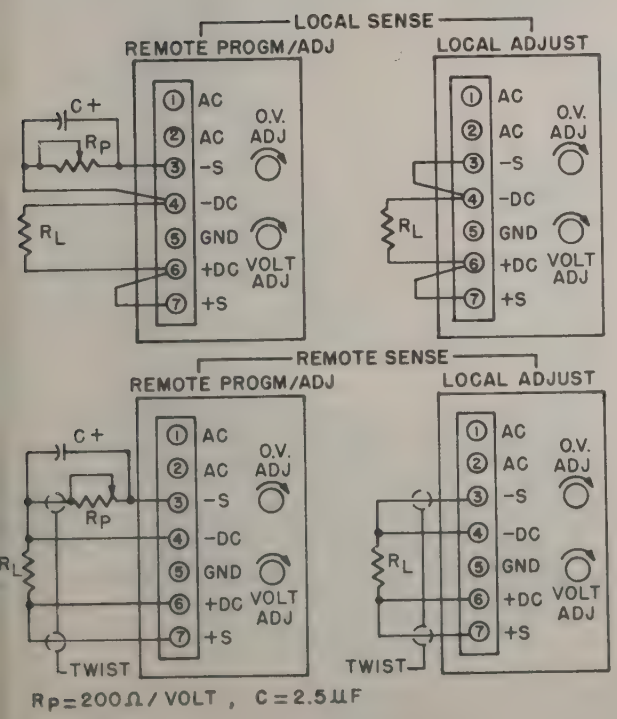
S UNI-B &C, PC, PM & PXS SERIES MODELS B &C



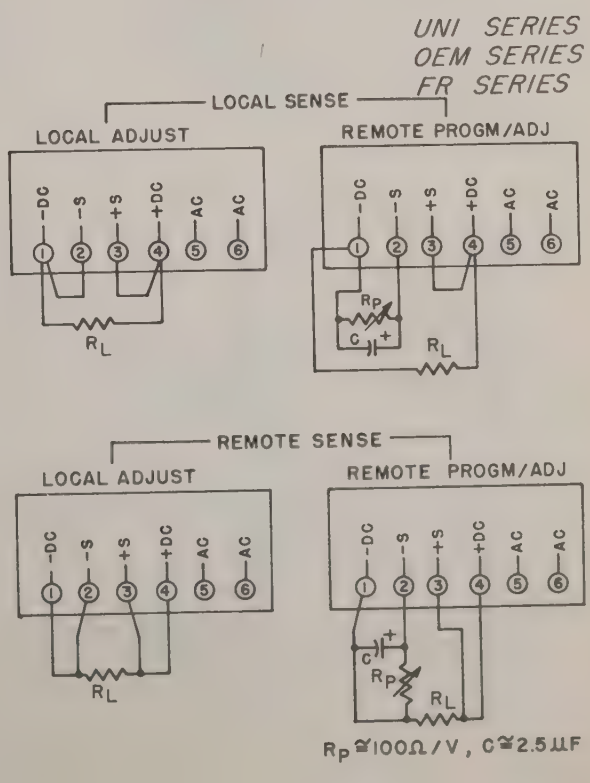
S UNI-D, E, EE PM & PXS SERIES MODELS D, E, EE

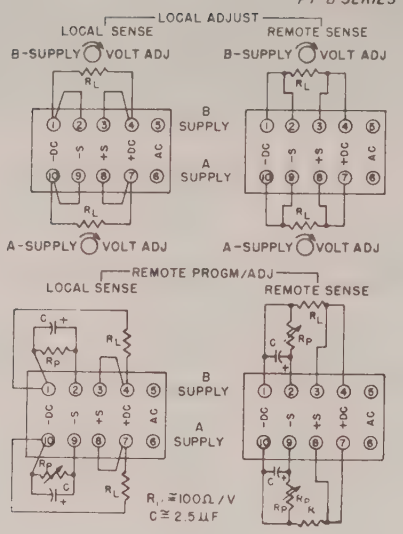


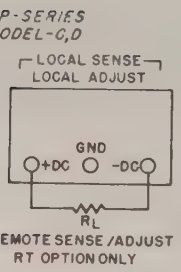
S UNI-CC, PM & PXS SERIES MODEL CC

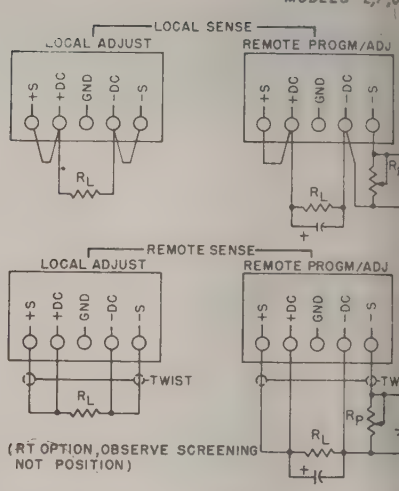


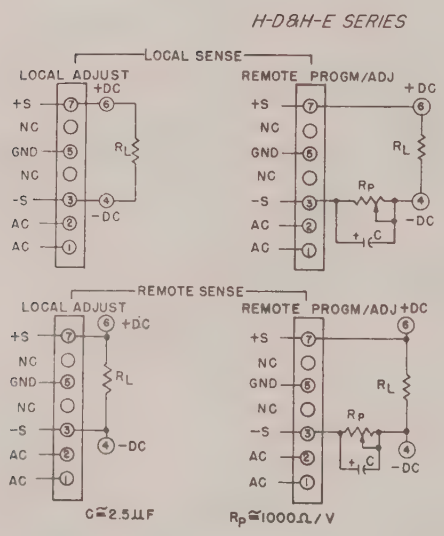
UNI SERIES OEM SERIES FR SERIES

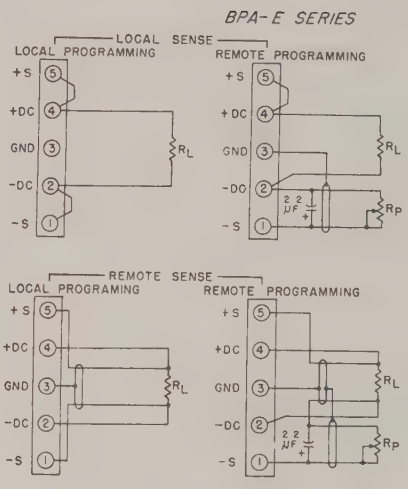


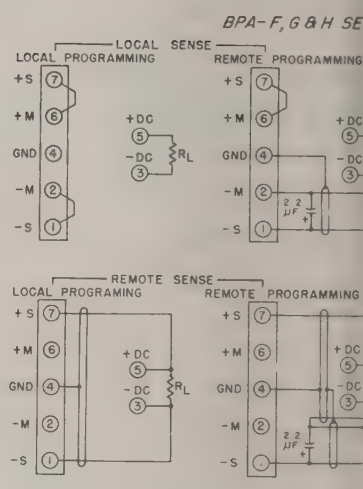

UNI-164
PT-8 SERIES
LOCAL ADJUST
LOCAL SENSE
REMOTE SENSE
B-SUPPLY VOLT ADJ
A-SUPPLY VOLT ADJ
B SUPPLY
A SUPPLY
REMOTE PROGM/ADJ
$R_L \cong 100\Omega/V$
$C \cong 2.5\mu F$

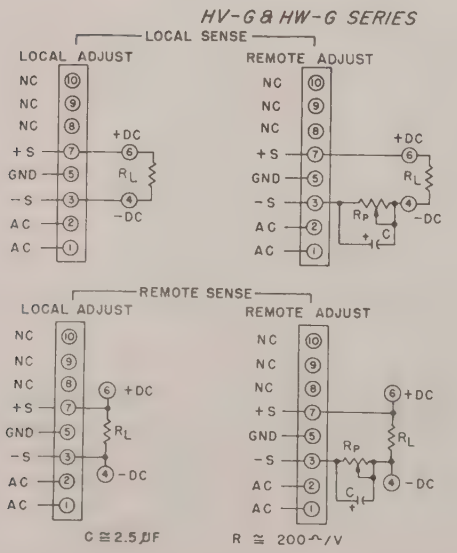

BP-SERIES
MODEL-C,D
LOCAL SENSE
LOCAL ADJUST
GND
+DC
-DC
R_L
REMOTE SENSE /ADJUST
RT OPTION ONLY

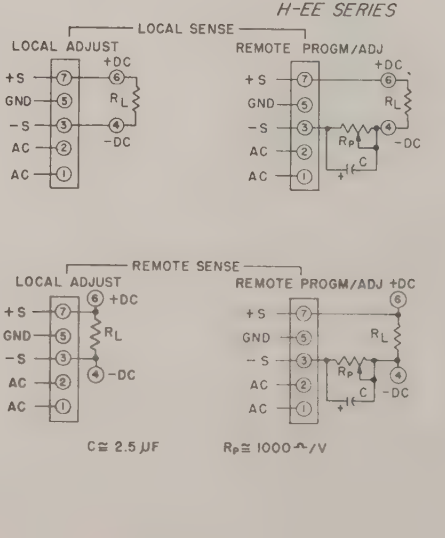

BP-SERIES
MODELS-E,F,G
LOCAL SENSE
LOCAL ADJUST
REMOTE PROGM/ADJ
+S
+DC
GND
-DC
-S
R_L
REMOTE SENSE
TWIST
R_P
(RT OPTION, OBSERVE SCREENING NOT POSITION)

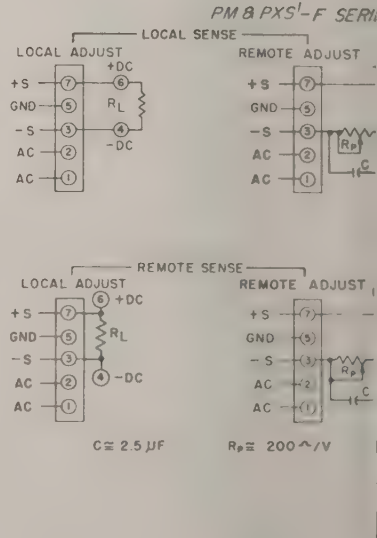

H-D&H-E SERIES
LOCAL SENSE
LOCAL ADJUST
REMOTE PROGM/ADJ
+DC
+S
NC
GND
-S
AC
-DC
R_L
R_P
C
REMOTE SENSE
$C \cong 2.5\mu F$
$R_P \cong 1000\Omega/V$

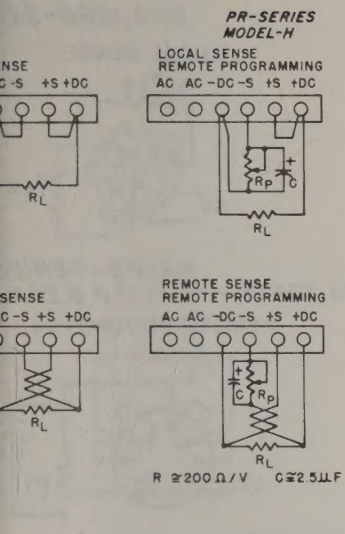

BPA-E SERIES
LOCAL SENSE
LOCAL PROGRAMMING
REMOTE PROGRAMMING
+S
+DC
GND
-DC
-S
R_L
R_P
2.2 μF
REMOTE SENSE

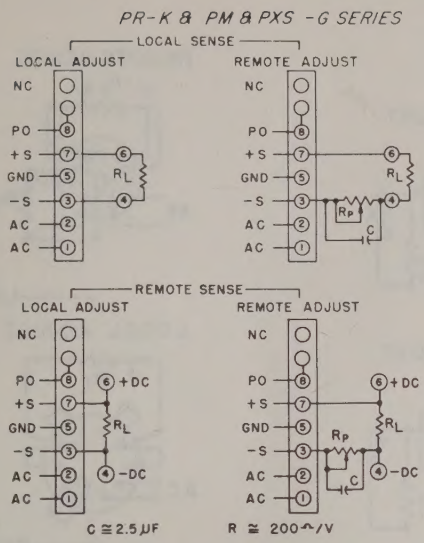

BPA-F,G&H SE
LOCAL SENSE
LOCAL PROGRAMMING
REMOTE PROGRAMMING
+S
+M
GND
-M
-S
+DC
-DC
R_L
2.2 μF
REMOTE SENSE

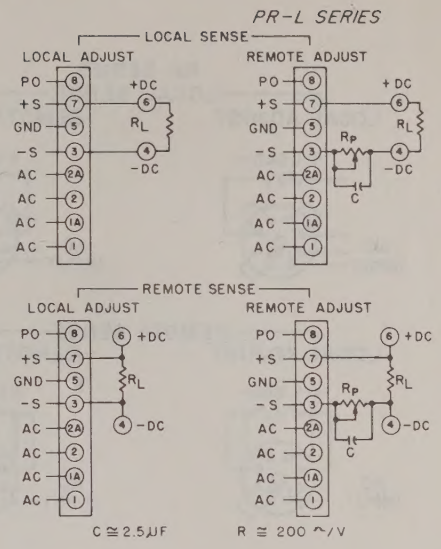

HV-G & HW-G SERIES
LOCAL SENSE
LOCAL ADJUST
REMOTE ADJUST
NC
+S
GND
-S
AC
+DC
-DC
R_L
R_P
C
REMOTE SENSE
$C \cong 2.5\mu F$
$R \cong 200\Omega/V$

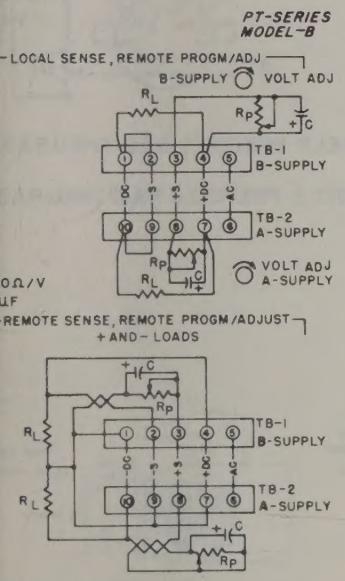

H-EE SERIES
LOCAL SENSE
LOCAL ADJUST
REMOTE PROGM/ADJ
+S
GND
-S
AC
+DC
-DC
R_L
R_P
C
REMOTE SENSE
$C \cong 2.5\mu F$
$R_P \cong 1000\Omega/V$

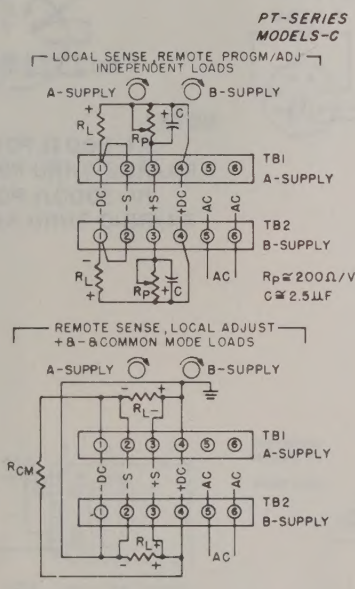

PM & PXS'-F SERI
LOCAL SENSE
LOCAL ADJUST
REMOTE ADJUST
+S
GND
-S
AC
+DC
-DC
R_L
R_P
C
REMOTE SENSE
$C \cong 2.5\mu F$
$R_P \cong 200\Omega/V$

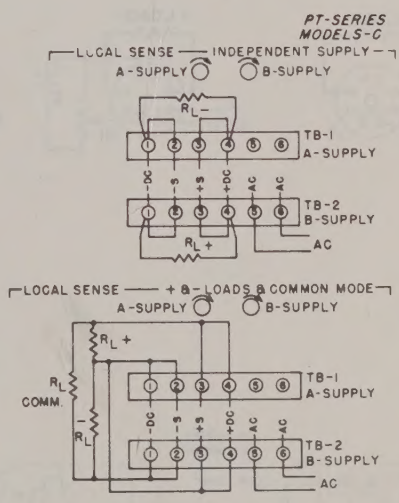












EM/ET SERIES

*** IMPORTANT ***

Read before attempting to operate power supply

ECONO/MATE POWER SUPPLY CONNECTIONS

5/6B
5/6C
24B
24C
24D

1. Positive and negative DC output terminals are marked and located on printed circuit board on chassis.
2. AC input is connected to terminals 1 and 2 on transformer.

12/15B

1. Positive and negative DC output terminals are marked and located on printed circuit board on chassis.
2. 12 or 15 volts DC output range is selected by soldering lead to desired transformer tap. Tap #3 is for the 15V range and tap #4 is for 12V DC output range.
3. AC input is connected to terminals 1 and 2 on transformer.

12/15C
12/15D

1. Positive and negative DC output terminals are marked and located on printed circuit board on chassis.
2. 12 or 15 volt DC output range is selected by soldering lead to desired transformer tap. Tap #5 is for the 15V range and tap #4 is for the 12V DC output range.
3. AC input is connected to terminals 1 and 2 on transformer.

EM5/6D

1. Positive and negative DC output terminals are marked and located on printed circuit board on chassis.
2. 5 or 6 volt DC output range is selected by soldering AC input leads to appropriate tap on transformer. Tap #3 is for 5V DC output range.

ET12/15C

1. Positive and negative DC output terminals are marked and located on each of the two printed circuit boards located on the chassis. Each DC output is isolated. A positive and negative terminal from each supply may be connected together for a common output terminal.
2. 12 volt DC output range is selected by connecting leads on transformer between taps marked 6 & 7, and 3 & 4.
3. 15 volt DC output range is selected by connecting leads on transformer between taps marked 6 & 8 and 3 & 5.
4. AC input is connected to terminals 1 & 2.

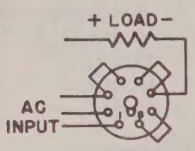
NOTE:

Output voltage adjustment is accomplished on all models by adjustment of potentiometer located on printed circuit board.

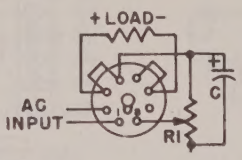
RA SERIES

LOCAL SENSE

LOCAL ADJUST

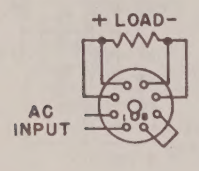


REMOTE ADJUST

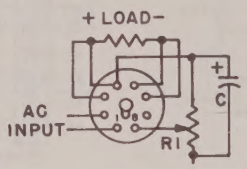


REMOTE SENSE

LOCAL ADJUST

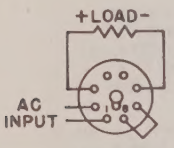


REMOTE ADJUST

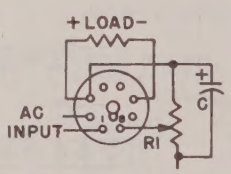


RB SERIES

LOCAL ADJUST

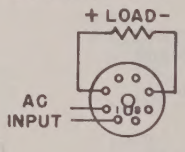


REMOTE ADJUST



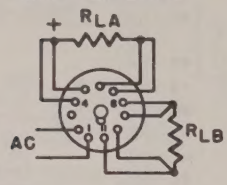
RC/RD SERIES

LINE AND LOAD CONNECTIONS

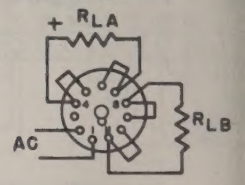


REMOTE SENSE

LOCAL ADJUST

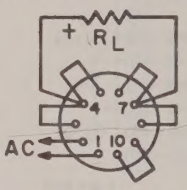


LOCAL SENSE

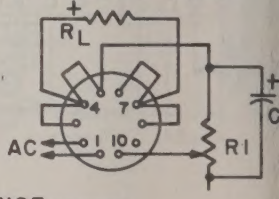


LOCAL SENSE

LOCAL ADJUST

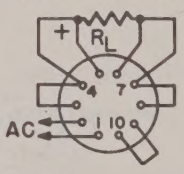


REMOTE PROGM/ADJ

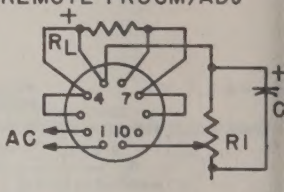


REMOTE SENSE

LOCAL ADJUST



REMOTE PROGM/ADJ

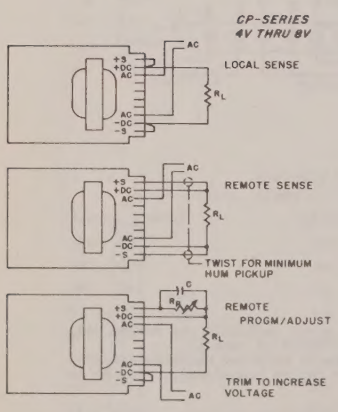


NOTE:

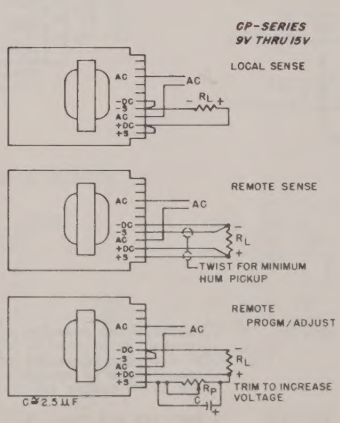
RI-500Ω POT FOR MODELS PREFIXED RA2 THRU RA8, RA/RB2 THRU RB8

RI-5000Ω POT FOR MODELS PREFIXED RAIO THRU RA5 RA/RBIO THRU RB385

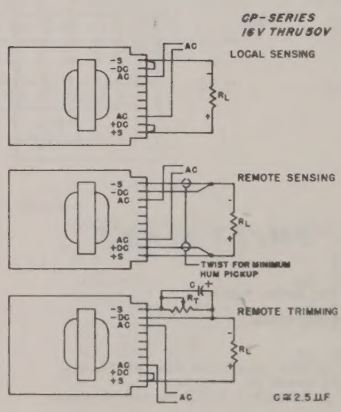
CP-SERIES 4V THRU 8V



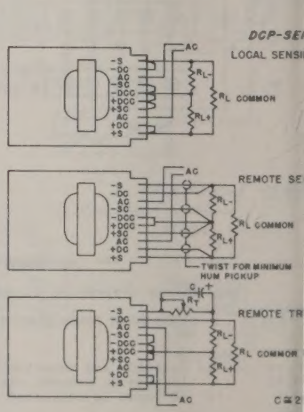
CP-SERIES 9V THRU 15V



CP-SERIES 16V THRU 30V



DCP-SE



1. ALL CAPACITOR VOLTAGES ≧ VOLTAGE OF SUPPLY
2. TWIST ALL REMOTE SENSING LEADS

3. REMOTE ADJUST: ADJUST INTERNAL POT TO MINIMUM VOLTAGE REQUIRED, ADD REQUIRED R_P TO BRING VOLTAGE UP TO MAXIMUM REQUIRED VOLTAGE. TRIM R_P TO ACTUAL VOLTAGE REQUI

MP MASTER
MA35109